CASE HISTORY

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PAVEMENT STABILIZATION USING TECHCELL GEOCELL AT KECHERI BYPASS ON THE THRISSUR - KUTTIPPURAM STATE HIGHWAY, KERALA

THRISSUR, KERALA, INDIA

Pavement Stabilization

Client:	Products used:
PWD KERALA	• TECHCELL GEOCELL • TCHGEO NONWOVEN GEOTEXTILE
Contractor:	
BAAB CONSTRUCTION INDIA PVT LTD.	
Manufacturer & Supplier:	Year of Construction:
TECHFAB (INDIA) INDUSTRIES LTD.	2024

Project Brief:

The Kecheri Bypass is a crucial 10-km stretch of road on the Thrissur - Kuttippuram State Highway, connecting local and intercity traffic. However, a specific 1.2-km section of this bypass, passing through the middle of a field, has been plagued by persistent issues of soil subsidence during the monsoon.

The region's weak subsoil and heavy rainfall lead to severe waterlogging, undermining the road's foundation. The combination of unstable ground conditions and inadequate drainage has caused recurring road collapses, rendering the section impassable during the rainy season. These disruptions not only affect traffic flow but also hinder regional connectivity, posing challenges for commuters and the transportation of goods. Traditional road construction techniques have failed to address these recurring issues due to the complex geotechnical conditions.

To overcome this, the Kerala Public Works Department (PWD) initiated a pioneering project aimed at providing a durable, cost-effective solution that ensures uninterrupted connectivity and reduces long-term maintenance needs, setting a benchmark for road construction in challenging terrains.

Photo 1 : Damaged Road and Waterlogging on Kecheri Bypass

Solution:

TechFab India proposed an innovative geosynthetic solution - TechCell Geocell for road construction on the Kecheri Bypass on the Thrissur - Kuttippuram State Highway, where geocells were used for the first time in the state. The solution involved the installation of Techcell Geocells, which were filled with a mixture of metal and M-sand (Wetmix Macadam) to provide stability and support. This technique was particularly beneficial for areas with challenging conditions, such as coastal roads and roads prone to permanent waterlogging.

TechFab India's approach used nonwoven geotextile as a base layer beneath the geocell structure. The nonwoven geotextile acted as a separation and filtration layer, preventing the mixing of subgrade soil with the aggregate fill material. This ensured the longevity and durability of the road while maintaining its strength and load-bearing capacity.

Geocells, made from high-density polyethylene (HDPE), were designed to distribute the weight of the road surface evenly, preventing rutting and deformation due to moisture infiltration and soil erosion. The honeycomb structure of the geocell offered enhanced reinforcement and improved load distribution, making it an ideal solution for areas with unstable subgrades.

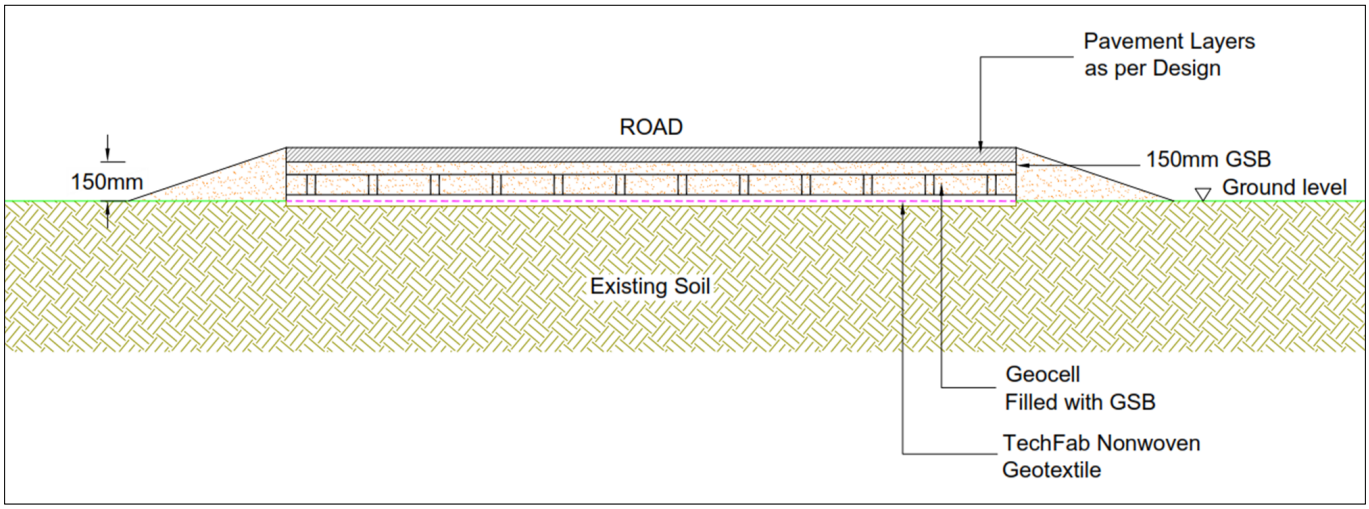
The use of this technology offered several advantages, including cost-effectiveness, quicker installation, and improved road performance in the long term. With this advanced solution, TechFab India aimed to significantly reduce road maintenance issues caused by waterlogging and soil instability, making it a sustainable and reliable choice for infrastructure development in challenging environments.

Why Techcell Geocell is recommended?

Techcell is the cellular confinement system created, indigenously manufactured and distributed by TechFab India made from High Density Polyethylene stabilized with carbon black which has higher tensile strength and stiffness.

Techcell is expanded on-site to form a honeycomb like structure, which is in filled with granular infill which creates unique cellular confinement system. Techcell will increase the shear strength of the confined soil, and increase load carrying capacity. With granular infill material and holes in Techcell wall, it enhances drainage and release pore water pressure.

Techcell is used for soil confinement, stabilization and reinforcement in wide variety of load support applications.



Typical Cross Section Drawing

Photo 2 : Spreading of TechCell Geocell

Photo 3 : - Filling of granular material into the TechCell Geocell

Execution on Site: :

- **Site Preparation**: Ensure the work site is well-prepared before installation. The ground should be compacted according to project specifications, and all surfaces must be free from organic materials, or sharp objects.

- **Geotextile Installation**: Install a geotextile layer underneath the Geocell system. Ensure the geotextile is aligned properly and extends beyond the edges of the Geocell to avoid shifting.

- **Geocell Stretching and Alignment**: Stretch the Techcell Geocell to cover the maximum area. Anchor the edge cells using J-pins (either permanent or temporary). Use hooks to align and fasten the Geocell properly.

- **Filling and Compaction**: Fill the Geocell system with the recommended infill material. Level it to approximately 30mm above the cells. Compact the infill material using a roller or compactor as advised by the engineer or according to project specifications.

- **Cell Alignment and Surface Compaction**: Ensure proper side-to-side alignment of the cells to prevent the loss of infill material. Compact every surface of the panels thoroughly as per the specifications to maintain stability.

- **Pavement Preparation**: Once the Geocell system is installed and compacted, prepare the road pavement for the laying of bituminous layers. Ensure the surface is level and stable for the application of the final layer.

- **Inspection and Quality Control**: Conduct thorough inspections during each phase of the installation, from ground preparation to final compaction, ensuring compliance with all engineering specifications and project standards for optimal performance and durability of the Geocell system.

Photo 4 : - Compaction of granular material

Photo 5 & 6 : Road Pavement after completion

Conclusion:

The project was successfully completed, achieving its intended purpose with innovative geosynthetic solutions. It ensured stability, reduced maintenance, and earned full satisfaction from the client and contractor.

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